

# Freshwater mollusc species from the River Someş/Szamos<sup>1</sup>, related to their ecological conditions

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## *Abstract*

The freshwater molluscs of the Someş/Szamos rivers have poorly been studied so far; only a few species and sampling points were mentioned in the last 150 years. The authors have found 22 mollusc species, and pointed out the disappearance of three species, namely *Theodoxus transversalis* (probably extinct from the whole Transylvania), *Bithynia leachi* and *Unio pictorum*. Most of the species have a patched distribution along the river, due to pollution and hydrotechnical works. On the basis of the present-day areas of some species, especially that of the family Unionidae, we have ranked the ecological state of the river sections.

**Keywords:** freshwater molluscs, Someş river, ecological conditions

## *Introduction*

The study of the aquatic molluscs on the Someş rivers was carried out in two periods, namely in 1992 and 1996, during the multidisciplinary research programmes organised by the Pro Europa Liga, Târgu Mureş (Romania) and the Tisza Klub, Szolnok (Hungary). The data concerning the malacofauna of this hydrographic system have been very summary until now. The authors (Bielz, 1862, 1867; Clessin, 1887; Csiki, 1906; Rotarides, 1941; Soós, 1943; Grossu, 1962, 1986, 1987) mentioned only a few species and their sampling points. However, the few quoted data compared with the results of the authors, illustrates the serious changes that took place in this rivers, due to the pollution and to the hydrotechnical works. Through the geomorphological and hydrological features of the Someş rivers, to which the anthropogenic impacts can be added, they represent a particular zonation of the mollusc fauna.

## *Materials and methods*

The freshwater molluscs were collected manually, or sampled with the Van Veen dredge or with a Surber benthometer. The authors have chosen 24 sampling points along the river valley, which are given in Table 1. Only qualitative samples have been collected because of the low abundance of most of the populations. These samples were collected to illustrate the diversity of the mollusc fauna.

<sup>1</sup> The first name is Romanian, and the second Hungarian

## Results and discussions

In the Someş rivers 25 species of freshwater molluscs have been identified (Table 1.), from which 22 were found during the expeditions and 3 species become extinct (*Theodoxus danubialis*, *Bithynia tentaculata* and *Unio pictorum*) and one is probably disappeared (*Aplexa hypnorum*). The Someşul Mic is formed by the confluence of the Someşul Cald and the Someşul Rece. The Someşul Mic with the Someşul Mare form the united Someş, which flows into the Tisza river in Hungary.

The Someşul Cald river on its upper reach, at Ic Ponor, has the aspect of a mountain rivulet, being populated by *Ancylus fluviatilis* (in the bed) and by *Radix peregra* (in pools from the valley). On this river there is a row of dam-lakes like Beliş, Tarniţa and Gilău. The latter captures also the water of the Someşul Rece, as it is situated at the confluence of the two rivers. On the Tarniţa lake, the authors collected the benthic fauna from four places, without identifying any species of molluscs. On the upper part of the river Someşul Rece *A. fluviatilis* was not found because of the acidity of the water, which flows through bogs in the neighbourhood of the source. At the level of the Blejoaia cottage, in a silt-up dam-lake, numerous individuals of *Pisidium casertanum* were collected, and in pools from the flood-area *R. peregra* was identified. On the river Someşul Mic (formed by the union of the two rivulets), downstream Gilău up to Fântânile Clujului (in the vicinity of the town), can reduced populations of *Unio crassus* and *Anodonta cygnea*. *Ancylus fluviatilis* be found until the river reaches Cluj municipality, then they disappear because of communal sewage discharge. In the last century Bielz (1862) mentioned the presence of this species in the riverbed in the area of the town. In 1954 a large population still existed in the Someş channel of the city (collected by Béla Kis). At the level of the dam-lake, near the Babeş Sports Park, a lot of individuals of *A. cygnaea* appeared in 1993, having a proper condition for their reproduction. Downstream of Cluj (the sampling points at Someşeni and Gherla) up to the confluence with the Someşul Mare, the river is seriously polluted with decaying organic material. Because of the pollution, this reach is populated only by *Physa acuta*, a species of Mediterranean-West-European origin, well adapted to such conditions. At Gherla *Theodoxus transversalis* was also found previously, but this species disappeared (collected by Oros E., quoted from Soós, 1943).

In the upper zone of the Someşul Mare, upstream of Şanţ village, we highlight the presence of *Anisus spirorbis*, quoted in scientific papers as a typical lowland species (Grossu, 1987). The authors collected some individuals from a pool in the Mărie Mare valley, above an altitude of 600 m. We also found huge populations of *R. peregra* and *P. amnicum* in artificial trout-breeding pools. Downstream Şanţ, the water and sediment quality is damaged because of sawdust, coming from the local industry of timber conversion. The sawdust changes the structure of the sediments and decay, a process consuming huge amounts of dissolved oxygen, thus becoming the main limiting factor for the benthic assemblages. For these reasons, *A. fluviatilis* disappears from the river, although specific biotopes exist. This situation is also valid for many tributaries, such as

Table 1.

	1	1A	2	3	4	5	6A	6	7	7A	8	8A	8B	9	10	10A	11	11A	11B	12	13	14	15	16
<i>Theodoxus transversalis</i> C. Pfeiffer, 1828						Ex									Ex									
<i>Viviparus contectus</i> Millet, 1813																					W			
<i>Bithynia leachi</i> Sheppard, 1823				Ex																				
<i>Physa acuta</i> Draparnaud, 1805					+	+									+	+	+	+	+	+	+	+	+	+
<i>Aplexa hypnorum</i> Linnaeus, 1758				E?																				
<i>Stagnicola palustris</i> (O. F. Müller, 1774)						+															+			
<i>Lymnaea stagnalis</i> (Linnaeus, 1758)												W									W			
<i>Radix auricularia</i> (Linnaeus, 1758)									+			W		+	+			+				+		
<i>Radix peregra</i> (O. F. Müller, 1774)	+	+	W+				W	W	+		+													
<i>Galba truncatula</i> (O. F. Müller, 1774)										+	+					+	+	+		+			+	
<i>Ancylus fluviatilis</i> O. F. Müller, 1774	+	+		+			+	+									+	+		+				
<i>Planorbis planorbis</i> (Linnaeus, 1758)																		+			W			
<i>Anisus spirorbis</i> (Linnaeus, 1758)							W																	
<i>Gyraulus albus</i> (O. F. Müller, 1774)													W											
<i>Gyraulus laevis</i> Alder, 1838														+										
<i>Planorbarius corneus</i> Linnaeus, 1758																					W			
<i>Succinea putris</i> (Linnaeus, 1758)				+					+					+							+			
<i>Oxyloma elegans</i> (Risso, 1826)								+	+		+	W		+	+	+					W			
<i>Unio pictorum</i> Linnaeus, 1758																						*		
<i>Unio crassus</i> Philipsson, 1788				+										+			+	+	+	+		+		
<i>Anodonta cygnaea</i> Linnaeus, 1758				+													+	+	+			*		+
<i>Pisidium amnicum</i> (O. F. Müller, 1774)									+															
<i>Pisidium casertanum</i> (Poli, 1791)			+																					
<i>Sphaerium corneum</i> (Linnaeus, 1758)								+													W			
<i>Sphaerium lacustris</i> (O. F. Müller, 1774)												W									W			



the Ilva river, in which we found only one living species, namely *Galba truncatula*, on the riverbanks. At Sângeorz Băi, the flow is slower and forms lentic habitats towards the banks, with fine sediments, where *Radix auricularia* appears, and on the marsh vegetation *Succinea putris* and *Oxyloma elegans* can be found. Downstream Salva, in a dead riverbed, we also found *Sphaerium lacustris*. In spite of the organic pollution of this river, at the level of Beclean village, 1 individual of *Unio crassus* was found. The presence of the fish species *Rhodeus sericeus ammarus* indicates the existence of some populations of Unionidae, inhabiting probably some tributaries.

Downstream the confluence of the Someșul Mare and the Someșul Mic, at Cășei, the river is polluted not only by the residual waters brought by the two rivers, but also by the industrial wastewater discharged from the cellulose and paper factory of Dej. Except *Physa acuta* other species was not found, although in 1992 some individuals of *Radix auricularia* were collected. The empty shells found in the river sediments prove the existence of a past population of *Unio crassus*. In the same place Soós (1943) speaks about the presence of *Theodoxus transversalis*, that disappeared forever from the river basin. Downstream Dej there are no pollution sources at all, thus the quality of the water and sediments improve, permitting the reappearance of the family Unionidae. At Somes Odorhei, near Năpradea village, *A. fluviatilis* and the species of the family Unionidae appear again. The dispersion of the bivalves is grouped and discontinuous, because of the distribution of the specific habitats. In the Defile from Țicău abundant populations of *Unio crassus* and *Anodonta cygnaea* exist, having an specimen proportion of 38% and 62% respectively. Downstream the Defile, at Sălsig, the water-flow is faster. We identified only *Unio crassus* there, as the single living species of the family Unionidae, having an ecological density of 5.4 individuals/m<sup>2</sup>. Downstream the confluence with Lăpuș river, the ecological state of the Someș river is degrading again. The Lăpuș collects the water of the Săsar rivulet, loaded with heavy metals and other xenobiotics discharged by the industry of Baia Mare, and it also collects the wastewater of the Căvnic river, loaded with wastewater from mining industry. In the Lăpuș river a population of *U. crassus* has been found in its upper part. These bivalves disappear at the confluence with Căvnic. Thus, all species of the family Unionidae disappear together with all the stenobiotic species, and *P. acuta* is prevailing again on the banks. In a ditch near the river, we found *Viviparus contectus*, *Planorbis planorbis*, *Sphaerium lacustris* and *Sphaerium corneum*. The lower reach of the Someș is characterised by an extremely low diversity of molluscs. Except *P. acuta*, which will be found along the riverbed until its confluence with Tisza, we note upstream of Satu Mare two individuals of *U. crassus* appearing probably accidentally in the river from some tributaries whose mollusc fauna is unknown. Satu Mare is the last pollution source, and this influence will remain unchanged until its mouth. At Olcsva we found only 1 individual of *A. cygnaea* which was probably washed from the flood area by high-waters.

In Figure 1. the number of the mollusc species can be seen, as it varies along the Someș riverbed (the flood area and the wetlands are not considered). The sampling points are codified in the same way as it is displayed in Tab. 1. The low number of species in the sites S1, S2 and S6 is owed to the high altitude and to the mountain aspect



of this river. Along the hill areas the relative diversity is increasing (S3). Due to pollutants, the number of species is very low in other sampling points of the Someșul Mic and the Someșul Mare. The diversity increases towards the Defile from Țicău and reach a maximum there. Afterwards it declines again because of pollution. In Figure 2. we represent the areas populated by Unionidae, and those which are polluted.

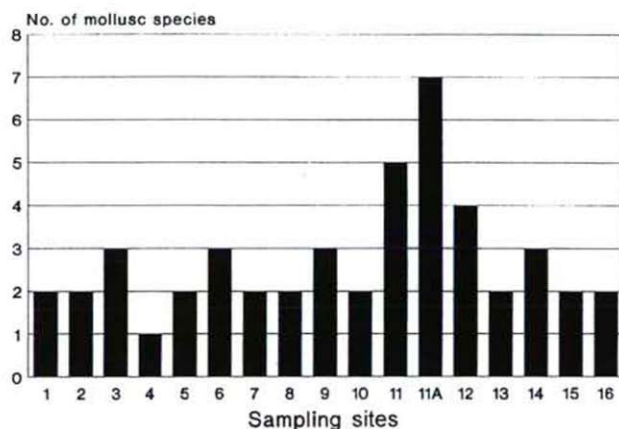


Figure 1. The number of mollusc species, found in the Someș river-bed

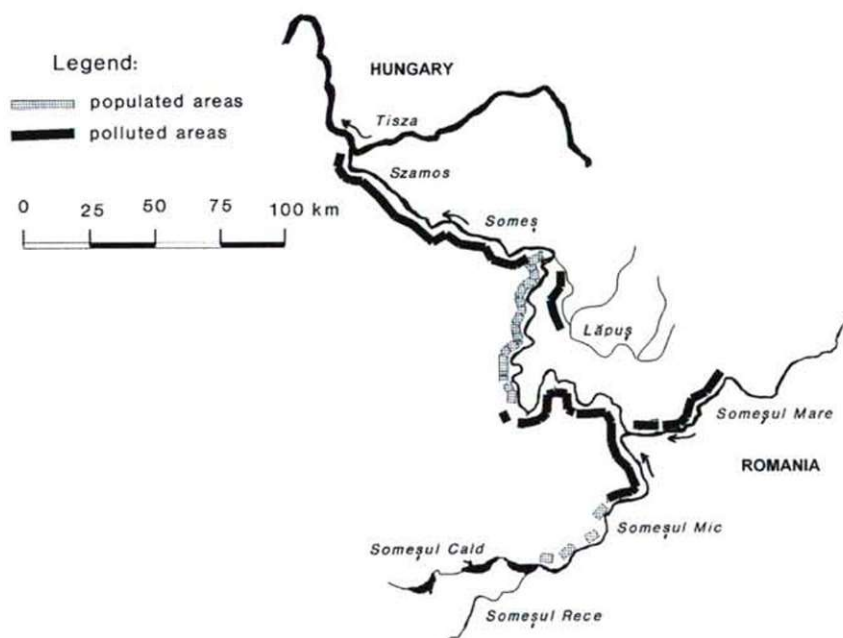


Figure 2. The range of the Unionidae species and the polluted reaches

## Conclusions

1. In present the Someş is one of the most polluted river in Transylvania and also affected very much by anthropogenic activities.
2. The highly polluted sections divide the dispersion areas of the freshwater molluscs, especially those of the species belonging to the family Unionidae. The communication between these patches is impossible because of the barriers represented by the affected reaches. The abundance of the individuals is decreasing towards a critical surviving number.
3. The mollusc communities consist of common eurybiotic species of pulmonates.
4. Comparing to 1992 the ecological state of the river slightly improved, probably due to the reduction of industrial works.
5. The Someş river is an important polluting factor of the Tisza.

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